MATH1

A PACKAGE OF PROGRAMS FOR THE RADIO SHACK TRS-80
AND THE SHARP PC-1211 POCKET COMPUTERS

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THE MATH1 PACKAGE

The MATH1 package consists of ten programs:

NAME	DESCRIPTION
GCD	Greatest Common Denominator
LCM	Least Common Multiple
PRIMEF	Prime Factors of Integers
PERCOM	Permutations and Combinations
VECTOR1	Analysis of Two Vectors
VECTOR2	Two Vector Operations
MATRIX1	Matrix Addition, Subtraction and Scalar (Dot) Multiplication
MATRIX2	Matrix Multiplication
MATRIX3	Matrix Inversion
SIMEQ	Solution of Simultaneous Equations

Instructions

All programs may be run in the DEF mode and are started by keying in SHIFT A. As with all data processing hardware and software, the user should utilize the program appropriately, bearing in mind the accuracy limits of the amazing pocket computers.

GREATEST COMMON DENOMINATOR (GCD)

This program will find the greatest common denominator of two integers input by the user.

```
1:"A"CLEAR :
  PAUSE "GREAT
  EST COMM. DE
  NOM.":PAUSE
  "ENTER TWO N
  UMBERS"
2:INPUT "FIRST
   NUMBER> ";A
3:INPUT "SECON
  D NUMBER> ";
  B
4:I=ABS A:J=
  ABS B
5:K=I-J*INT (I
  /J):IF K=0
  THEN 9
7:I=J:J=K:GOTO
  5
9:BEEP 3:PRINT
  "G.C.D. = ";
  J:INPUT "MOR
  E DATA (Y/N)
   ? ";Z$:IF Z
  $="Y"THEN 1
10:PAUSE "END O
  F RUN...":
  END
```

Example

Finding the greatest common denominator of 12 and 56:

ENTRY	DISPLAY
SHIFT A	GREATEST COMM.DENOM.
	ENTER TWO NUMBERS
	FIRST NUMBER
12 *ENTER*	SECOND NUMBER
56 *ENTER*	G.C.D.=4
ENTER	MORE DATA (Y/N)? **
N *ENTER*	END OF RUN

** The prompt "MORE DATA (Y/N)" is used with every program in the MATH1 package and will not be repeated in every sample run description.

Major Variables

A	FIRST NUMBER
B	SECOND NUMBER
I, K	WORKING
J	G.C.D.
Z$	ANSWER

LEAST COMMON MULTIPLE (LCM)

This program will find the least common multiple of up to one hundred integers input by the user. The more numbers and the more disparity amongst the numbers, the longer it takes to derive an answer. Remember, the PC is rather slow when cycling FOR loops.

```
1:"A"CLEAR :
  PAUSE "LEAST
   COMMON MULT
  IPLE":INPUT
  "HOW MANY NU
  MBERS ? ";N:
  M=N+26
2:IF M>126
  PAUSE "TOO M
  ANY: MAX=100
  ":GOTO 1
3:FOR I=27TO M
  :J=J+1:PAUSE
  "ENTER # ";J
  :INPUT "#> "
  ;A(I):NEXT I
  :L=A(27)
4:FOR I=27TO M
  :BEEP 1:IF
  INT (L/A(I))
  =L/A(I)LET K
  =K+1:GOTO 6
5:L=L+1
6:NEXT I:IF K
  <>NLET K=0:
  GOTO 4
7:PRINT "L.C.M
  . = ";L:
  INPUT "MORE
  DATA (Y/N) ?
   ";Z$:IF Z$=
  "Y"THEN 1
8:PAUSE "END O
  F RUN...":
  END
```

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Example

Finding the least common multiple of 10, 20, 30:

ENTRY	DISPLAY
SHIFT A	LEAST COMMON MULTIPLE HOW MANY NUMBERS ?
3 *ENTER*	ENTER # 1 #
10 *ENTER*	ENTER # 2 #
20 *ENTER*	ENTER # 3 #
30 *ENTER*	L.C.M.=60

Major Variables

I	LOOP COUNTER
J	VARIABLE COUNTER
K	DECISION VARIABLE
L	L.C.M.
M	ARRAY DIMENSION
N	#OF INTEGERS
Z$	ANSWER
A(27)-A(127)	INTEGER ARRAY

PRIME FACTORS OF INTEGERS (PRIMEF)

This program will list the prime factors of a non-zero integer.

```
1:"A"CLEAR :
  PAUSE "PRIME
   FACTORS/INT
  EGERS":INPUT
  "ENTER NUMBE
  R> ";N
3:X=SGN N:
  PRINT "P/F =
   ";X:N=ABS N
5:X=N:FOR I=2
  TO X:Y=0
7:IF N/I<>INT
  (N/I)THEN 11
9:N=N/I:Y=Y+1:
  GOTO 7
11:IF Y=0THEN 1
   5
13:BEEP 3:PRINT
   "P/F = ";I;"
   ^";Y
15:NEXT I:PAUSE
   "NO MORE FAC
   TORS":INPUT
   "MORE DATA (
   Y/N) ? ";Z$:
   IF Z$="Y"
   THEN 1
17:PAUSE "END O
   F RUN...":
   END
```

Example

Finding the prime factors of 27:

ENTRY	DISPLAY
SHIFT A	PRIME FACTORS/INTEGERS ENTER NUMBER
27 *ENTER*	P/F=1
ENTER	P/F=3^3
ENTER	NO MORE FACTORS

Major Variables

I	LOOP COUNTER / WORKING
N	NUMBER TO BE FACTORED
X	WORKING
Y	POWER OF FACTOR
Z$	ANSWER

PERMUTATIONS AND COMBINATIONS (PERCOM)

This program computes both the permutations and combinations for the set and subset input by the user.

```
1:"A"CLEAR :
  PAUSE "PERMU
  TATIONS/":
  PAUSE "COMBI
  NATIONS":
  INPUT "# OF
  OBJECTS IN S
  ET> ";N
3:INPUT "# IN
  SUBSET> ";S:
  IF S>NPAUSE
  "SUBSET TOO
  LARGE":GOTO
  13
5:P=1:C=1:K=0:
  FOR I=N-S+1
  TO N:IF P>9.
  9E99PRINT "O
  VERFLOW":
  STOP
7:K=K+1:IF K=1
  OLET K=0:
   PAUSE "COMPU
   TING"
 9:P=PI:NEXT I:
   FOR J=2TO S:
   C=CJ:NEXT J:
   C=P/C
11:PRINT "PERM.
    = ";P:PRINT
   "COMB. = ";C
13:INPUT "ANOTH
   ER SUBSET (Y
   /N) ? ";Z$:
   IF Z$="Y"
   THEN 3
15:INPUT "MORE
   DATA (Y/N) ?
    ";Z$:IF Z$=
   "Y"THEN 1
17:PAUSE "END O
   F RUN...":
   END
```

Example

Computing the permutations and combinations for the set 15 and the subset 7:

ENTRY	DISPLAY
SHIFT A	PERMUTATIONS/ COMBINATIONS #OF OBJECTS IN SET
15 *ENTER*	# IN SUBSET
7 *ENTER*	PERM.=32432400
ENTER	COMB.=6435
ENTER	ANOTHER SUBSET ?

Major Variables

C	NUMBER OF COMBINATIONS
I, J, K	LOOP COUNTERS
N	NUMBER IN SET
P	NUMBER OF PERMUTATIONS
S	NUMBER IN SUBSET
Z$	ANSWER

ANALYSIS OF TWO VECTORS (VECTOR1)

This program will compute various parameters for two vectors. The user must input the coordinates for each vector in three dimensions. Each vector is assumed to begin at the origin (0, 0, 0).

```
1:"A"CLEAR :
  PAUSE "ANALY
  SIS OF TWO V
  ECTORS"
3:PAUSE "VECTO
  R 1 COORDINA
  TES":INPUT "
  X(1)> ";C:
  INPUT "Y(1)>
   ";E:INPUT "
  Z(1)> ";G
5:PAUSE "VECTO
  R 2 COORDINA
  TES":INPUT "
```

```
   X(2)> ";D:
   INPUT "Y(2)>
    ";F:INPUT "
   Z(2)> ";H:S=
   57.29578:
   RADIAN
 7:FOR I=1TO 2:
   A(I)=√(A(I+2
   )^2+A(I+4)^2
   +A(I+6)^2):
   IF A(I)=0
   THEN 17
 9:BEEP 1:X=A(I
   ):GOSUB 31:
   PRINT "MAGNI
   TUDE OF V";I
   ;"= ";X
11:X=ACS (A(I+2
   )/A(I))*S:
   GOSUB 31:
   PRINT "ANGLE
   /X-AXIS=";X;
   " DEGS"
13:X=ACS (A(I+4
   )/A(I))*S:
   GOSUB 31:
   PRINT "ANGLE
   /Y-AXIS=";X;
   " DEGS"
15:X=ACS (A(I+6
   )/A(I))*S:
   GOSUB 31:
   PRINT "ANGLE
   /Z-AXIS=";X;
   " DEGS"
17:NEXT I:X=0:
   IF (A=0)+(B=
   0)THEN 25
19:X=(CD+EF+GH)
   /A/B:IF X<>0
   THEN 23
21:X=90:GOTO 25
23:X=(ACS X)*S:
   GOSUB 31
25:BEEP 1:GOSUB
   31:PRINT "AN
   GLE/VECTORS=
   ";X;" DEGS"
27:INPUT "ANOTH
   ER ANALYSIS(
   Y/N)?";Z$:IF
   Z$="Y"THEN 1
29:PAUSE "END O
   F RUN...":
   END
31:X=INT (10X+.
   5)/10:RETURN
```

Example

Computing the magnitude and various angles of the two vectors (1, 6, 6) and (6, 6, 4):

ENTRY	DISPLAY
SHIFT A	ANALYSIS OF TWO VECTORS
	VECTOR 1 COORDINATES
	X(1)
1 *ENTER*	Y(1)
6 *ENTER*	Z(1)
6 *ENTER*	VECTOR 2 COORDINATES
	X(2)
6 *ENTER*	Y(2)
6 *ENTER*	Z(2)
4 *ENTER*	MAGNITUDE OF V1=8.5
ENTER	ANGLE/X-AXIS=83.3 DEGS
ENTER	ANGLE/Y-AXIS=45.4 DEGS
ENTER	ANGLE/Z-AXIS=45.4 DEGS
ENTER	MAGNITUDE OF V2=9.4
ENTER	ANGLE/X-AXIS=50.2 DEGS
ENTER	ANGLE/Y-AXIS=50.2 DEGS
ENTER	ANGLE/Z-AXIS=64.8 DEGS
ENTER	ANGLE/VECTORS=34.6 DEGS

Major Variables

A, B	INTERMEDIATE VALUES
C	X(1) VALUE
D	X(2) VALUE
E	Y(1) VALUE
F	Y(2) VALUE
G	Z(1) VALUE
H	Z(2) VALUE
I	LOOP COUNTER
S	CONSTANT (57.29578)
X	WORKING
Z$	ANSWER
A(I)	VECTOR VALUES

OPERATIONS ON TWO VECTORS (VECTOR2)

This program will compute the sum, difference, scalar (dot) product and cross product of two vectors inputted by the user. The results of one specified operation or of all the operations may be displayed. Each vector is assumed to begin at the origin (0, 0, 0).

```
 1:"A"CLEAR :
   PAUSE "TWO V
   ECTOR OPERAT
   IONS":PAUSE
   "VECTOR 1 CO
   ORDINATES":N
   $=" ,"
 3:INPUT "X(1)>
    ";A:INPUT "
   Y(1)> ";B:
   INPUT "Z(1)>
    ";C
 4:PAUSE "VECTO
   R 2 COORDINA
   TES"
 5:INPUT "X(2)>
    ";X:INPUT "
   Y(2)> ";Y:
   INPUT "Z(2)>
    ";Z
 7:D=A+X:E=B+Y:
   F=C+Z:G=A-X:
   H=B-Y:I=C-Z:
   J=AX+BY+CZ:K
   =BZ-CY:L=CX-
   AZ:M=AY-BX
 9:PAUSE "SELEC
   T (Y/N)":
   INPUT "ADDIT
   ION> ";V$:IF
   V$="Y"THEN 1
   9
11:INPUT "SUBTR
   ACTION> ";V$
   :IF V$="Y"
   THEN 21
13:INPUT "SCALA
   R (DOT) PROD
   UCT> ";V$:IF
   V$="Y"THEN 2
   3
15:INPUT "CROSS
    PRODUCT> ";
   V$:IF V$="Y"
   THEN 25
17:INPUT "ALL>
   ";V$:W=1
19:PRINT "A+B="
   ;D;N$;E;N$;F
   :IF W=0THEN
   27
21:PRINT "A-B="
   ;G;N$;H;N$;I
   :IF W=0THEN
   27
23:PRINT "A.B =
    ";J:IF W=0
   THEN 27
25:PRINT "A*B="
   ;K;N$;L;N$;M
27:INPUT "MORE
   DATA (Y/N) ?
    ";V$:IF V$=
   "Y"THEN 1
29:PAUSE "END O
   F RUN...":
   END
```

Example

Computing all operations on the vectors (1, 6, 6) and (6, 6, 4):

ENTRY	DISPLAY
SHIFT A	TWO VECTOR OPERATIONS
	VECTOR 1 COORDINATES
	X(1)
1 *ENTER*	Y(1)
6 *ENTER*	Z(1)
6 *ENTER*	VECTOR 2 COORDINATES
	X(2)
6 *ENTER*	Y(2)
6 *ENTER*	Z(2)
4 *ENTER*	ADDITION

ENTER	SUBTRACTION
ENTER	SCALAR (DOT) PRODUCT
ENTER	CROSS PRODUCT
ENTER	ALL
Y *ENTER*	A+B=7,12,10
ENTER	A-B=-5,0,2
ENTER	A.B=66
ENTER	A*B=-12,32,-30

Major Variables

A	X(1)
B	Y(1)
C	Z(1)
D	X1+X2
E	Y1+Y2
F	Z1+Z2
G	X1-X2
H	Y1-Y2
I	Z1-Z2
J	X1X2+Y1Y2+Z1Z2
K	Y1Z2-Z1Y2
L	Z1X2-X1Z2
M	X1Y2-Y1X2
N$	" "
V$	ANSWER
X	X(2)
Y	Y(2)
Z	Z(2)

MATRIX ADDITION, SUBTRACTION AND SCALAR MULTIPLICATION (MATRIX1)

This program will perform addition and subtraction between two matrices of the same dimensions as well as scalar multiplication on one matrix. Any number of rows and columns may be used as long as the product of rows times columns (R*C) does not exceed 45.

```
 1:"A"CLEAR :
   PAUSE "   MA
   TRIX OPERATI
   ONS":PAUSE "
   SELECT (Y/N)
    ":INPUT "AD
   DITION> ";Z$
   :IF Z$="Y"
   LET O=1:GOTO
   9
 3:INPUT "SUBTR
   ACTION> ";Z$
   :IF Z$="Y"
   LET O=2:GOTO
   9
 5:INPUT "SCALA
   R MULTIPLICA
   TION>";Z$:IF
   Z$="Y"LET O=
   3:INPUT "ENT
   ER SCALAR VA
   LUE> ";V:
   GOTO 9
 7:PAUSE "INCOR
   RECT ENTRY..
   .":GOTO 1
 9:PAUSE "    M
   ATRIX DIMENS
   ION":INPUT "
   # OF ROWS> "
   ;R:INPUT "#
   OF COLUMNS>
   ";C:T=RC
11:IF T>45PAUSE
   "TOO MANY: M
   AX(R*C)=45:G
   .31
13:S=26-R:U=S+T
   :BEEP 1:
   PAUSE "ENTER
    VALUES":FOR
   K=1TO 2:BEEP
   2:PAUSE "MAT
   RIX ";K:FOR
   J=1TO R
15:FOR I=1TO C:
   PAUSE "ROW";
   J;"/COL";I:
   INPUT "VALUE
   > ";B:IF K=1
   LET A(S+RJ+I
   )=B
17:IF K=2LET A(
   U+RJ+I)=B
19:NEXT I:NEXT
   J:IF O=3THEN
   23
21:NEXT K
23:BEEP 3:PAUSE
   "RESULTANT M
   ATRIX":FOR J
   =1TO R:FOR I
   =1TO C:X=A(S
   +RJ+I):Y=A(U
   +RJ+I):IF O=
   2LET Y=-Y
25:IF O<=2LET A
   =X+Y
27:IF O=3LET A=
   VX
29:A=INT (1E4A+
   .5)/1E4:BEEP
   1:PRINT "ROW
   ";J;"/COL";I
   ;" = ";A:
   NEXT I:NEXT
   J
31:INPUT "ANOTH
   ER (Y/N) ? "
   ;Z$:IF Z$="Y"
   "THEN 1
33:PAUSE "END O
   F RUN...":
   END
100:FOR I=27TO 1
   00:PRINT "A(
   ";I;")=";A(I
   ):NEXT I
```

Example

Adding the first two matrices (which yields the third):

6	4		7	4		13	8
5	6	+	7	4	=	12	10
9	5		1	3		10	8

ENTRY	DISPLAY
SHIFT A	MATRIX OPERATIONS
	SELECT (Y/N)
	ADDITION
Y *ENTER*	MATRIX DIMENSION
	#OF ROWS
3 *ENTER*	#OF COLUMNS
2 *ENTER*	ENTER VALUES
	MATRIX 1
	ROW1/COL1
	VALUE
6 *ENTER*	.... etc. ...
.... etc. ...	RESULTANT MATRIX
	ROW1/COL1 = 13
ENTER	.... etc. ...

Major Variables

A, B	WORKING
C	COLUMN DIMENSIONS
I, J, K	LOOP COUNTERS
O	OPERATION
R	ROW DIMENSION
S	ROW FACTOR
T	R*C
U	S+T
V	SCALAR VALUE
X, Y	WORKING
Z$	ANSWER
A(S+CX+Y)	A(R, C) MATRIX 1
A(U+CX+Y)	B(R, C) MATRIX 2

MATRIX MULTIPLICATION (MATRIX2)

This program will multiply two matrices using matrix algebra. Any number of rows and columns may be used as long as the product of rows times columns (R*C) does not exceed 45. Matrix multiplication requires that the number of rows in the first matrix equal the number of columns in the second matrix. The resultant matrix is square.

```
 1:"A"CLEAR :
   PAUSE "MATRI
   X MULTIPLICA
   TION":PAUSE
   "MATRIX A DI
   MENSIONS":
   INPUT "# OF
   ROWS> ";Q
 3:INPUT "# OF
   COLUMNS> ";B
   :T=BQ:PAUSE
   "MATRIX B DI
   MENSIONS":
   INPUT "# OF
   ROWS> ";R
 5:INPUT "# OF
   COLUMNS> ";C
   :D=26-B:V=26
   +T-C
 7:IF Q<>CFOR I
   =1TO 3:PAUSE
   "ROWS(A)<>CO
   LS(B)":NEXT
   I:GOTO 23
 9:IF (BQ>45)+(
   RC>45)FOR I=
   1TO 3:PAUSE
   "TOO LARGE:M
   AX(RC)=45":
   NEXT I:GOTO
   23
11:PAUSE "ENTER
    VALUES-MATR
   IX A":FOR J=
   1TO Q:FOR I=
   1TO B:PAUSE
   "ROW";J;" /C
   OL";I
12:INPUT "> ";X
   :A(D+BJ+I)=X
   :NEXT I:NEXT
   J
13:PAUSE "ENTER
    VALUES-MATR
   IX B":FOR J=
   1TO R:FOR I=
   1TO C:PAUSE
   "ROW";J;"/CO
   L";I
15:INPUT "> ";X
   :A(V+CJ+I)=X
   :NEXT I:NEXT
   J
17:PAUSE "RESUL
   TANT MATRIX"
   :FOR I=1TO Q
   :FOR J=1TO C
   :S=0
19:FOR K=1TO B:
   S=S+A(D+BI+K
   )*A(V+CK+J):
   NEXT K:S=INT
   (1E4S+.5)/1E
   4
21:PRINT "ROW";
   I;" /COL";J;
   " = ";S:NEXT
   J:NEXT I
23:INPUT "ANOTH
   ER MATRIX (Y
   /N) ?";Z$:IF
   Z$="Y"THEN 1
25:PAUSE "END O
   F RUN...":
   END
```

Example

Multiplying two matrices (yielding the third):

$$\begin{matrix} 3 & 1 \\ 5 & 1 \\ 2 & 4 \end{matrix} \times \begin{matrix} 4 & 1 & 4 \\ 5 & 6 & 2 \end{matrix} = \begin{matrix} 17 & 9 & 14 \\ 25 & 11 & 22 \\ 28 & 26 & 16 \end{matrix}$$

ENTRY	DISPLAY
SHIFT A	MATRIX MULTIPLICATION
	MATRIX A DIMENSIONS
	#OF ROWS
3 *ENTER*	#OF COLUMNS
2 *ENTER*	MATRIX B DIMENSIONS
	#OF ROWS
2 *ENTER*	#OF COLUMNS
3 *ENTER*	ENTER VALUES-MATRIX A
	ROW1/COL1
3 *ENTER*	.... etc. ...
.... etc. ...	RESULTANT MATRIX
	ROW1/COL1 = 17
ENTER	.... etc. ...

Major Variables

B	MATRIX A COLUMNS
C	MATRIX B COLUMNS
D	ROW FACTOR
I, J, K	LOOP COUNTERS
Q	MATRIX A ROWS
R	MATRIX B ROWS
T	Q*B
V	ROW FACTOR
X	WORKING
Z$	ANSWER
A(D+BJ+I)	A(Q, B) MATRIX A
A(V+CJ+I)	A(R, C) MATRIX B

MATRIX INVERSION (MATRIX3)

This program will invert a square matrix. The maximum allowable dimension is 6 x 6. The computational procedure utilized is modified Gauss-Jordan.

```
 1:"A"CLEAR :
   PAUSE "MATRI
   X INVERSION"
   :INPUT "MATR
   IX DIMENSION
   > ";R:D=26-R
   :V=26+RR-R
 3:IF R>6FOR I=
   1TO 3:PAUSE
   "MAX=6":NEXT
   I:GOTO 29
 5:PAUSE "ENTER
    ELEMENTS":
   FOR J=1TO R:
   FOR I=1TO R:
   PAUSE "ROW";
   J;" /COL";I:
   INPUT "> ";X
   :A(D+RJ+I)=X
 7:NEXT I:A(V+R
   J+J)=1:NEXT
   J
 9:GOSUB 33:FOR
   J=1TO R:BEEP
   1:FOR I=JTO
   R:IF A(D+RI+
   J)<>0THEN 13
11:NEXT I:FOR Y
   =1TO 3:PAUSE
   "MATRIX IS S
   INGULAR!!":
   NEXT Y:GOTO
   29
13:GOSUB 33:FOR
   K=1TO R:S=A(
   D+RJ+K):A(D+
   RJ+K)=A(D+RI
   +K):A(D+RI+K
   )=S:S=A(V+RJ
   +K)
15:A(V+RJ+K)=A(
   V+RI+K):A(V+
   RI+K)=S:NEXT
   K:T=1/A(D+RJ
   +J)
17:GOSUB 33:FOR
   K=1TO R:A(D+
   RJ+K)=T*A(D+
   RJ+K):A(V+RJ
   +K)=T*A(V+RJ
   +K):NEXT K
19:GOSUB 33:FOR
   L=1TO R:IF L
   =JTHEN 25
21:T=-A(D+RL+J)
   :FOR K=1TO R
   :A(D+RL+K)=A
   (D+RL+K)+T*A
   (D+RJ+K)
23:A(V+RL+K)=A(
   V+RL+K)+T*A(
   V+RJ+K):NEXT
   K
25:NEXT L:NEXT
   J:BEEP 3
26:PAUSE "RESUL
   TANT MATRIX"
   :FOR I=1TO R
   :FOR J=1TO R
   :X=INT (1E4*
   A(V+RI+J)+.5
   )/1E4
27:PRINT "R";I;
   "/C";J;"=";X
```

```
    :NEXT J:NEXT
    I
29:INPUT "ANOTH
    ER MATRIX (Y
    /N)? ";Z$:IF
    Z$="Y"THEN 1
```

```
31:PAUSE "END O
    F RUN...":
    END
33:PAUSE "PROGR
    AM RUNNING":
    RETURN
```

Example

Inverting the matrix shown (yielding the result):

1	0.14	0.35		1.1631	-.1547	-.404
0.14	1	0.02	=	-.1547	1.021	0.0337
0.35	0.02	1		-.404	0.0337	1.1407

ENTRY	DISPLAY
SHIFT A	MATRIX INVERSION
	MATRIX DIMENSION
3 *ENTER*	ENTER ELEMENTS
	ROW1/COL1
1 *ENTER*	.... etc. ...
.... etc. ...	RESULTANT MATRIX
	R1/C1 = 1.1631
ENTER	.... etc. ...

Major Variables

I, J, K. L	LOOP COUNTERS
R	MATRIX DIMENSION
V	ROW FACTOR
X, Y	WORKING
Z$	ANSWER
A(D+RJ+I)	A(J, I) ORIGINAL MATRIX
A(V+RJ+I)	B(J, I) INVERTED MATRIX

SOLUTION OF SIMULTANEOUS EQUATIONS (SIMEQ)

This program will solve a system of linear equations. The program will prompt for the coefficients and constants of each equation. The maximum allowable number of equations is nine.

```
1:"A"CLEAR :
  PAUSE "SIMUL
  TANEOUS EQUA
  TIONS"
3:INPUT "# OF
  EQUATIONS> "
  ;N:D=26-N:F=
  N+1
4:IF N>9PAUSE
  "TOO MANY: M
  AX=9":GOTO 2
  5
5:FOR J=1TO N:
  PAUSE "EQUAT
  ION #";J:FOR
  I=1TO N+1:IF
  I=N+1THEN 9
```

```
7:PAUSE "COEFF
  ICIENT ";I;"
  >":GOTO 11
9:PAUSE "CONST
  ANT>"
11:INPUT "> ";A
  :A(D+FJ+I)=A
  :NEXT I:NEXT
  J
12:FOR J=1TO N:
  FOR I=JTO N:
  IF A(D+FJ+I)
  <>0THEN 15
13:NEXT I:BEEP
  4:PAUSE "NO
  SOLUTION":
  PAUSE "MATRI
  X IS SINGULA
  R":GOTO 25
15:GOSUB 29:FOR
  K=1TO N+1:L=
  D+FJ+K:M=D+F
  I+K:X=A(L):A
  (L)=A(M):A(M
  )=X:NEXT K
17:Y=1/A(D+FJ+J
  ):FOR K=1TO
  N+1:L=D+FJ+K
  :A(L)=Y*A(L)
  :NEXT K
19:GOSUB 29:FOR
  I=1TO N:IF I
  =JTHEN 23
21:Y=-A(D+FI+J)
  :FOR K=1TO N
  +1:L=D+FI+K:
  A(L)=A(L)+Y*
  A(D+FJ+K):
  NEXT K
23:NEXT I:NEXT
  J
24:BEEP 3:FOR I
  =1TO N:X=INT
  (1E4*A(D+FI+
  F)+.5)/1E4:
  PRINT "X";I;
  " = ";X:NEXT
  I
25:INPUT "MORE
  EQUATIONS (Y
  /N) ? ";Z$:
  IF Z$="Y"
  THEN 1
27:PAUSE "END O
  F RUN...":
  END
29:BEEP 1:PAUSE
  "PROGRAM RUN
  NING":RETURN
```

Example

Solving the system of equations:

X1	+	.1447X2	+	.3521X3	=	.6735
.1447X1	+	X2	+	.0225X3	=	.532
.3521X1	+	.0225X2	+	X3	=	.3475

Which has the solution:

X1	=	.5592
X2	=	.4479
X3	=	.1405

ENTRY	DISPLAY
SHIFT A	SIMULTANEOUS EQUATIONS
	# OF EQUATIONS
3 *ENTER*	EQUATION 1
	COEFFICIENT 1
1 *ENTER*	COEFFICIENT 2
.1447 *ENTER*	COEFFICIENT 3
.3521 *ENTER*	CONSTANT
.6735 *ENTER*	.... etc. ...
.... etc. ...	X1 = .5592
ENTER	.... etc. ...

Major Variables

A	WORKING
D	ROW FACTOR
F	COLUMN FACTOR
I, J, K	LOOP COUNTERS
N	NUMBER OF EQUATIONS
X	SOLUTIONS
Y	WORKING
Z$	ANSWER
A(D+FI+J)	A(I, J) MATRIX OF COEFFICIENTS AND CONSTANTS

The programs in the MATH1 package may be obtained on cassette tape in the format used by the Radio Shack TRS-80 and Sharp PC-1211 Pocket Computers by remitting $5.00 plus $1.00 shipping/handling (total of $6.00) and mentioning the POCKET COMPUTER NEWSLETTER to: THE POCKETWARE GROUP, 3607 Oklahoma Avenue, Tampa, Florida 33611. A catalog listing pocket computer software covering areas including Mathematics, Statistics, Business and Utility Subroutines may be obtained from THE POCKETWARE GROUP by sending a legal-size self-addressed stamped envelope. (If you order a cassette you will automatically receive a catalog from THE POCKETWARE GROUP.)